

## § 431.86

## 10 CFR Ch. II (1–1–08 Edition)

“Test Procedures and Efficiency Standards for Commercial Packaged Boilers,” Docket No. EE-RM/TP-99-470, 1000 Independence Avenue, SW., Washington, DC 20585.

(2) *Obtaining copies of Standards.* Anyone can purchase a copy of HI BTS-2000 from the Hydronics Institute Division of GAMA, P.O. Box 218, Berkeley Heights, NJ 07922, or <http://www.gamanet.org/publist/hydroordr.htm>; and a copy of ASME PTC 4.1-1964/RA-1991 from Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112, 800-854-7179.

### § 431.86 Uniform test method for the measurement of energy efficiency of commercial packaged boilers.

(a) *Scope.* This section provides test procedures that must be followed for measuring, pursuant to EPCA, the steady state combustion efficiency of a gas-fired or oil-fired commercial packaged boiler. These test procedures apply to packaged low pressure boilers that have rated input capacities of 300,000 Btu/hr or more and are “commercial packaged boilers, but do not apply under EPCA to “packaged high pressure boilers.”

(b) *Definitions.* For purposes of this section, the Department incorporates by reference the definitions specified in Section 3.0 of the HI BTS-2000 (Incorporated by reference, see § 431.85), with the exception of the definition for the terms “packaged boiler”, “condensing boilers”, and “packaged low pressure steam” and “hot water boiler”.

(c) *Test Method for Commercial Packaged Boilers—General.* After October 23, 2006, follow the provisions in this paragraph (c) for all testing of packaged low pressure boilers that are commercial packaged boilers. Prior to that date, follow either the provisions of this paragraph (c) or of paragraph (d) of this section to test steel boilers, but follow the provisions of this paragraph for all other commercial packaged boilers.

(1) *Test Setup—(i) Classifications:* If employing boiler classification, you must classify boilers as given in Section 4.0 of the HI BTS-2000 (Incorporated by reference, see § 431.85).

(ii) *Requirements:* Conduct the combustion efficiency test as given in Sec-

tion 5.2 (Combustion Efficiency Test) of the HI BTS-2000 (Incorporated by reference, see § 431.85).

(iii) *Instruments and Apparatus:*

(A) Follow the requirements for instruments and apparatus in sections 6 (Instruments) and 7 (Apparatus), of the HI BTS-2000 (Incorporated by reference, see § 431.85), with the exception of section 7.2.5 (flue connection for outdoor boilers) which is replaced with paragraph (c)(1)(iii)(B) of this section:

(B) *Flue Connection for Outdoor Boilers:* For oil-fired and power gas outdoor boilers, the integral venting means may have to be revised to permit connecting the test flue apparatus described in section 7.2.1 of BTS-2000. A gas-fired boiler for outdoor installation with a venting system provided as part of the boiler must be tested with the venting system in place.

(iv) *Test Conditions:* Use test conditions from Section 8.0 (excluding 8.5.2, 8.5.3, and 8.6.2) of HI BTS-2000 (Incorporated by reference, see § 431.85) for the combustion efficiency testing, and use paragraph (c)(1)(iv)(A) of this section when testing a condensing boiler:

(A) *Water Temperatures for Condensing Boilers—*For condensing boilers the outlet temperature shall be  $180^{\circ}\text{F} \pm 2^{\circ}\text{F}$  and the inlet temperature shall be  $80^{\circ}\text{F} \pm 5^{\circ}\text{F}$  at all times during the test. (See also paragraphs (c)(2)(i) and (ii) of this section for condensing boilers.).

(B) [Reserved]

(2) *Test Measurements.* (i) Measure for combustion efficiency according to sections 9.1 (excluding sections 9.1.1.2.3 and 9.1.2.2.3), 9.2 and 10.2 of the HI BTS-2000 (Incorporated by reference, see § 431.85), except that for condensing boilers, replace the boiler water inlet temperature in section 9.1.2.1.4 of the HI BTS-2000 standard with the inlet temperature specified in paragraph (c)(1)(iv)(A) of this section.

(ii) *Procedure for the Measurement of Condensate for a Condensing Boiler.* Collect flue condensate as specified in Section 9.2.2 of HI BTS-2000 (Incorporated by reference, see § 431.85). Measure the condensate from the flue gas under steady state operation for the 30 minute collection period during the 30 minute steady state combustion efficiency test. Flue condensate mass shall

be measured immediately at the end of the 30 minute collection period to prevent evaporation loss from the sample. The humidity of the room shall at no time exceed 80 percent. Determine the mass of flue condensate for the steady state period by subtracting the tare container weight from the total container and flue condensate weight measured at the end of the test period.

(iii) *A Boiler That is Capable of Supplying Either Steam or Hot Water—(A) Testing.* For purposes of EPCA, measure the combustion efficiency of a commercial packaged boiler capable of supplying either steam or hot water either by testing the boiler in the steam mode or by testing it in both the steam and hot water modes.

(B) *Rating.* If testing the boiler only in the steam mode, use the efficiency determined from such testing to rate the boiler for both the steam and water modes. If testing the boiler in both modes, rate the boiler's efficiency for each mode based on the testing in that mode.

(3) *Calculation of Combustion Efficiency.* Use the calculation procedure for the combustion efficiency test specified in Section 11.2 (including the specified subsections of 11.1) of the HI BTS-2000 (Incorporated by reference, see § 431.85).

(d) *Steel Commercial Packaged Boilers—Alternative Test Method.* Until October 23, 2006, follow either the provisions of this paragraph (d), or of paragraph (c) of this section, to test steel commercial packaged boilers.

(1) *Test setup.* Instead of using HI BTS-2000 as specified in paragraph (c)(1) of this section, conduct the combustion efficiency test for steel packaged low pressure boilers that are commercial packaged boilers using the Abbreviated Efficiency Test (Simplified Efficiency Test or The Short Form) as specified in ASME PTC 4.1 (Incorporated by reference, see § 431.85). If selecting the ASME PTC 4.1 procedure for conducting the required combustion efficiency test for steel boilers, conduct the test under conditions as specified in paragraphs (d)(1)(i) and (ii) of this section.

(i) Use the test procedure for the efficiency test from ASME PTC 4.1 (Incorporated by reference, see § 431.85). Con-

duct the combustion efficiency test with the Abbreviated Efficiency Test (Simplified Efficiency Test or The Short Form) for gas and oil fuels described in Section 1.07 of ASME PTC 4.1 (Incorporated by reference, see § 431.85).

(ii) *Test Conditions for the Combustion Efficiency.*

(A) Steam pressure for steam boilers—Test must be made at atmospheric pressure or at a pressure not exceeding 2 psig.

(B) Water temperature for hot water boilers—The inlet temperature must be 35 °F to 80 °F, except that when a boiler is tested in the field after installation the inlet temperature may be as recommended by the manufacturer, but must not exceed 140 °F. The outlet temperature shall be 180 °F  $\pm$  2 °F.

(C) After steady state operation is achieved, the minimum duration of a test run shall be 30 minutes.

(2) *Test Measurements.* Use the test procedure from Section 5, Efficiency by Heat Loss Method, of ASME PTC 4.1 (Incorporated by reference, see § 431.85). Use the test conditions as specified in paragraph (d)(1) of this section. For a boiler that is capable of supplying either steam or hot water, follow paragraph (c)(2)(iii) of this section.

(3) *Calculation of Combustion Efficiency.* Use the heat loss method for gas or oil fuel as specified in Section 7.3 and the Test Forms for the Abbreviated Efficiency Test, PTC 4.1-a (Summary Sheet) and PTC 4.1-b (Calculation Sheet), of ASME PTC 4.1 to determine the combustion efficiency, except that the following specific heat loss terms (as listed in Section 7.3 of ASME PTC 4.1) to 0: sections 7.3.2.03 (moisture in fuel), 7.3.2.01 (combustible in dry refuse), 7.3.2.10 (radiation to surroundings), 7.3.2.05 through 7.3.2.09 and 7.3.2.11 through 7.3.2.14 (unmeasured losses) must be set. (Incorporated by reference, see § 431.85)

#### ENERGY EFFICIENCY STANDARDS

#### § 431.87 Energy conservation standards and their effective dates.

Each manufacturer of a commercial packaged boiler manufactured on or after January 1, 1994, must meet the following energy efficiency standard levels: